

ABSTRACT OF THE DISCLOSURE

5 An ultra low NOx burner for process heating is provided which includes a fluid based flame stabilizer which provides a fuel-lean flame at an equivalence ratio in the range of $\phi = 0.05$ to $\phi = 0.3$ and fuel staging lances surrounding the flame stabilizer in circular, flat, or load shaping profiles, each lance comprising a pipe having a staging nozzle at a firing end thereof, each lance having at least one hole for staging fuel
10 injection, and each hole having a radial divergence angle and an axial divergence angle. The at least one hole and the divergence angles provide circular, flat or load shaping flame pattern. The burner provides NOx emissions of less than 9 ppmv at near stoichiometry combustion conditions.

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